

Unit 2 Selected Answers

13 -26 (No solutions provided.)

4.1

1. All three functions are even.

3. $\cos(x)$

7. -1

15. true

4.2

$$1. \cos(75^\circ) = \frac{\sqrt{6}-\sqrt{2}}{4}$$

$$6. \tan(375^\circ) = \frac{3-\sqrt{3}}{3+\sqrt{3}} = 2-\sqrt{3}$$

$$10. \cos\left(\frac{7\pi}{12}\right) = \frac{\sqrt{2}-\sqrt{6}}{4}$$

16.

$$(a) \cos(\alpha + \beta) = -\frac{\sqrt{2}}{10}$$

$$(b) \sin(\alpha + \beta) = \frac{7\sqrt{2}}{10}$$

$$(c) \tan(\alpha + \beta) = -7$$

$$(d) \cos(\alpha - \beta) = -\frac{\sqrt{2}}{2}$$

$$(e) \sin(\alpha - \beta) = \frac{\sqrt{2}}{2}$$

$$(f) \tan(\alpha - \beta) = -1$$

20 - 34 (No solutions provided.)

4.3

3.

$$(a) \sin(2\theta) = -\frac{336}{625}$$

$$(b) \cos(2\theta) = \frac{527}{625}$$

$$(c) \tan(2\theta) = -\frac{336}{527}$$

6.

$$(a) \sin(2\theta) = -\frac{\sqrt{15}}{8}$$

$$(b) \cos(2\theta) = \frac{7}{8}$$

$$(c) \tan(2\theta) = -\frac{\sqrt{15}}{7}$$

8.

$$(a) \sin(2\theta) = \frac{24}{25}$$

$$(b) \cos(2\theta) = -\frac{7}{25}$$

$$(c) \tan(2\theta) = -\frac{24}{7}$$

4.4

$$1. \cos(75^\circ) = \frac{\sqrt{2}-\sqrt{3}}{2}$$

$$6. \cos\left(\frac{7\pi}{12}\right) = -\frac{\sqrt{2}-\sqrt{3}}{2}$$

$$10. \tan\left(\frac{7\pi}{8}\right) = -\sqrt{\frac{2-\sqrt{2}}{2+\sqrt{2}}} = 1-\sqrt{2}$$

18.

$$(a) \sin\left(\frac{\theta}{2}\right) = \frac{3\sqrt{13}}{13}$$

$$(b) \cos\left(\frac{\theta}{2}\right) = -\frac{2\sqrt{13}}{13}$$

$$(c) \tan\left(\frac{\theta}{2}\right) = -\frac{3}{2}$$

22.

$$(a) \sin\left(\frac{\theta}{2}\right) = \frac{\sqrt{26}}{26}$$

$$(b) \cos\left(\frac{\theta}{2}\right) = -\frac{5\sqrt{26}}{26}$$

$$(c) \tan\left(\frac{\theta}{2}\right) = -\frac{1}{5}$$

28.

$$(a) \sin\left(\frac{\theta}{2}\right) = \sqrt{\frac{7+4\sqrt{3}}{14}}$$

$$(b) \cos\left(\frac{\theta}{2}\right) = \sqrt{\frac{7-4\sqrt{3}}{14}}$$

$$(c) \tan\left(\frac{\theta}{2}\right) = \sqrt{\frac{7+4\sqrt{3}}{7-4\sqrt{3}}}$$

5.1

$$1. \arcsin(-1) = -\frac{\pi}{2}$$

$$3. \sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) = -\frac{\pi}{4}$$

$$5. \arcsin(0) = 0$$

$$7. \sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = \frac{\pi}{4}$$

$$9. \arcsin(1) = \frac{\pi}{2}$$

$$11. \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) = \frac{5\pi}{6}$$

$$13. \cos^{-1}\left(-\frac{1}{2}\right) = \frac{2\pi}{3}$$

$$15. \arccos\left(\frac{1}{2}\right) = \frac{\pi}{3}$$

$$17. \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{6}$$

$$21. \sin\left(\sin^{-1}\left(\frac{3}{5}\right)\right) = \frac{3}{5}$$

$$25. \cos\left(\arccos\left(-\frac{1}{2}\right)\right) = -\frac{1}{2}$$

$$30. \arcsin\left(\sin\left(-\frac{\pi}{3}\right)\right) = -\frac{\pi}{3}$$

$$35. \arccos\left(\cos\left(\frac{2\pi}{3}\right)\right) = \frac{2\pi}{3}$$

$$39. \sin\left(\arccos\left(-\frac{1}{2}\right)\right) = \frac{\sqrt{3}}{2}$$

$$41. \cos\left(\arcsin\left(-\frac{5}{13}\right)\right) = \frac{12}{13}$$

$$46. \tan(\sin^{-1}(x)) = \frac{x}{\sqrt{1-x^2}} \text{ for } -1 < x < 1$$

5.2

$$1. \arctan(-\sqrt{3}) = -\frac{\pi}{3}$$

$$3. \tan^{-1}\left(-\frac{\sqrt{3}}{3}\right) = -\frac{\pi}{6}$$

$$5. \arctan\left(\frac{\sqrt{3}}{3}\right) = \frac{\pi}{6}$$

$$7. \tan^{-1}(\sqrt{3}) = \frac{\pi}{3}$$

$$9. \operatorname{arccot}(-1) = \frac{3\pi}{4}$$

$$11. \cot^{-1}(0) = \frac{\pi}{2}$$

$$13. \operatorname{arccot}(1) = \frac{\pi}{4}$$

$$15. \tan(\tan^{-1}(-1)) = -1$$

$$20. \cot(\operatorname{arccot}(1)) = 1$$

$$26. \tan^{-1}\left(\tan\left(-\frac{\pi}{4}\right)\right) = -\frac{\pi}{4}$$

$$36. \sin(\cot^{-1}(\sqrt{5})) = \frac{\sqrt{6}}{6}$$

$$40. \tan\left(\arccos\left(-\frac{1}{2}\right)\right) = -\sqrt{3}$$

5.3

$$1. \operatorname{arcsec}(2) = \frac{\pi}{3}$$

$$3. \sec^{-1}(\sqrt{2}) = \frac{\pi}{4}$$

$$5. \operatorname{arcsec}\left(\frac{2\sqrt{3}}{3}\right) = \frac{\pi}{6}$$

$$7. \sec^{-1}(1) = 0$$

$$9. \operatorname{arcsec}(-2) = \frac{2\pi}{3}$$

$$11. \sec^{-1}\left(-\frac{2\sqrt{3}}{3}\right) = \frac{5\pi}{6}$$

$$13. \csc^{-1}(-2) = -\frac{\pi}{6}$$

$$15. \operatorname{arccsc}\left(-\frac{2\sqrt{3}}{3}\right) = -\frac{\pi}{3}$$

$$22. \csc\left(\csc^{-1}(\sqrt{2})\right) = \sqrt{2}$$

$$30. \sec^{-1}\left(\sec\left(-\frac{\pi}{2}\right)\right) \text{ is undefined}$$

$$41. \tan\left(\operatorname{arcsec}\left(\frac{5}{3}\right)\right) = \frac{4}{3}$$

$$47. \csc(\operatorname{arccot}(9)) = \sqrt{82}$$

$$54. \csc(\arccos(x)) = \frac{1}{\sqrt{1-x^2}} \text{ for } -1 < x < 1$$

5.4

$$1. \cos^{-1}(-0.4) \approx 1.98$$

$$4. \cos^{-1}(0.8) \approx 0.64$$

$$19. 68.9^\circ$$

$$21. 51^\circ$$

$$23. 41.81^\circ$$

6.1

$$1. 44.43^\circ$$

$$7. x = \arccos\left(-\frac{2}{9}\right) + 2\pi k \text{ or } x = -\arccos\left(-\frac{2}{9}\right) + 2\pi k, \text{ in } [0, 2\pi), x \approx 1.7949, 4.4883$$

$$9. x = \arccos(0.117) + 2\pi k \text{ or } x = 2\pi - \arccos(0.117) + 2\pi k, \text{ in } [0, 2\pi), x \approx 1.4535, 4.8297$$

$$12. x = \arctan(117) + \pi k, \text{ in } [0, 2\pi), x \approx 1.56225, 4.70384$$

14.

$$x = \arccos\left(\frac{2}{3}\right) + 2\pi k \text{ or } x = 2\pi - \arccos\left(\frac{2}{3}\right) + 2\pi k, \text{ in } [0, 2\pi), x \approx 0.8411, 5.4422$$

6.2

$$1. x = \frac{\pi k}{5}; x = 0, \frac{\pi}{5}, \frac{2\pi}{5}, \frac{3\pi}{5}, \frac{4\pi}{5}, \pi, \frac{6\pi}{5}, \frac{7\pi}{5}, \frac{8\pi}{5}, \frac{9\pi}{5}$$

4.

$$x = \frac{\pi}{24} + \frac{\pi k}{6}; x = \frac{\pi}{24}, \frac{5\pi}{24}, \frac{3\pi}{8}, \frac{13\pi}{24}, \frac{17\pi}{24}, \frac{7\pi}{8}, \frac{25\pi}{24}, \frac{29\pi}{24}, \frac{11\pi}{8}, \frac{37\pi}{24}, \frac{41\pi}{8}, \frac{15\pi}{8}$$

6.

$$x = \frac{\pi}{12} + \frac{2\pi k}{3} \text{ or } x = \frac{7\pi}{12} + \frac{2\pi k}{3}; x = \frac{\pi}{12}, \frac{7\pi}{12}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{17\pi}{12}, \frac{23\pi}{12}$$

$$10. x = -\frac{\pi}{3} + \pi k; x = \frac{2\pi}{3}, \frac{5\pi}{3}$$

$$15. x = \frac{\pi}{3} + \pi k \text{ or } x = \frac{2\pi}{3} + \pi k; x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

6.3

$$1. x = \frac{\pi}{4}, \frac{5\pi}{4}$$

$$4. x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$$

$$6. x = \frac{\pi}{3}, \frac{5\pi}{3} \quad 9. x = \frac{7\pi}{6}, \frac{11\pi}{6}, \arcsin\left(\frac{1}{3}\right), \pi - \arcsin\left(\frac{1}{3}\right)$$

$$11. x = 0, \frac{2\pi}{3}, \frac{4\pi}{3} \quad 20. x = \frac{\pi}{2}, \frac{3\pi}{2}$$